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Part one

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Introduction

This book is about the experiments carried out over the past two decades in which it was attempted to impart a language, either natural or invented, to an ape. The debate engendered by these projects has been of interest – consuming for some, passing for others – to all of those whose concerns include the enduring questions of human nature, among them anthropologists, psychologists, linguists, biologists, and philosophers.

An adequate treatment of the linguistic capabilities of apes entails consideration of a number of related issues, each of which is an interesting problem in its own right. Continuities in primate mentality, the relationship between language and thought in the individual and in the species, and the origin of language in, again, both the ontogenetic and the phylogenetic senses, are themes that will recur throughout this work. Development of parts of the argument will require moderately technical excursions into American Sign Language grammar, recursive rules in language, the neuropsychology of language, naturalistic primate communication, and language acquisition in children. A grounding in the last topic, in particular, is crucial to the argument, for the ape-language dispute is essentially a quarrel about how similar the performance of the linguistic apes is to that of young children acquiring language.

The method followed in this book is one of detailed (though, hopefully, not tedious) critical analysis of the experimental methods and conclusions of the ape-language projects. The analysis is based on data summaries, published anecdotes, and experimenters' conclusions – in short, on published material rather than on primary data. At the outset of this work, I requested samples of original transcriptions and/or videotaped records of linguistic productions from all but one of the sign-language (as opposed to artificial-language) projects.¹ The experimenters uniformly declined to provide such materials. Although this was disappointing, I am confident that enough could be gleaned about the nature of the "raw" data from

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published material to justify the conclusions about apes and language contained in the following pages.

The nature of those conclusions will be evident early on: none of the ape-language projects succeeded, despite employing years of tutelage far more intense than that experienced by most children, in implanting in an ape a capacity for language equal to that of a young child, let alone an adult. This argument is developed in chapters 3 through 6. Chapter 2 provides a description of each of the projects, while chapters 7 and 8 consider alternative explanations for the “language gap.”

WHY THE APE-LANGUAGE CONTROVERSY IS A CONTROVERSY

All scientific arguments have in common at least these elements: (1) a minimum of two positions regarding the subject in dispute, positions generally held to be irreconcilable, and (2) an intensification of the normal emotional investment of the scientist in his or her position, due in some measure to the contending itself but perhaps also related to the ideological significance of the subject within the larger society. If, in addition, the argument includes suggestions of fraudulent or quasi-fraudulent procedures, the disagreement becomes a controversy. To the extent that this is an accurate characterization of scientific controversies, the ape-language debate is an exemplary one.

The radical opposition of opinion about the achievements of the various ape-language projects is well conveyed by the following quotations:

[Washoe] learned a natural human language and her early utterances were highly similar to, perhaps indistinguishable from the early utterances of human children. (Gardner and Gardner 1978, p. 73)

The evidence we have makes it clear that even the brightest ape can acquire not even so much as the weak grammatical system exhibited by very young children. (Premack and Premack 1983, p. 115)

On measures of sign performance (form), sign order (structure), semantic relations (meaning), sign acts (function) and sign acquisition (development), apes appear to be very similar to 2 to 3 year old human children learning sign ... Apes also appear to be very similar to 2 to 3 year old human children learning to speak. (Miles 1978, p. 114)

[The experimental chimpanzees] show, after years of training and exposure to signing, not the slightest trace of homological development parallel to that of human children. (Leiber 1984, p. 84)

After years of gentle teaching Koko has learned to use American Sign Language – the very same sign language used by the deaf. With her new-found vocabulary, Koko is now providing us with an astounding wealth of knowledge about the way animals view the world. (Patterson 1985a, p. 1)

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In *Koko, A Talking Gorilla*, a stirring film documentary that opened last December in Manhattan, Koko does a fine job of acting like a gorilla, but otherwise the film is mostly flimflam. (Martin Gardner 1980, p. 3)

It is unlikely that any of us will in our lifetimes see again a scientific breakthrough as profound in its implications as the moment when Washoe, the baby chimpanzee, raised her hand and signed “come-gimme” to a comprehending human. (Hill 1978, p. 109)

The systems taught to apes and other species differ from human language at the most primitive and elementary level. (Chomsky 1979, p. 38)

What is most likely to be occurring in the ape research is self-deception, in the form of experimental expectancy effects or the “trimming” or “cooking” of data by investigators ... as opposed to outright fraud ... (Umiker-Sebeok and Sebeok 1980, p. 31)

There are several sources of the stridency of the debate, which probably peaked with the threat by Allen and Beatrice Gardner, who conducted the Washoe sign-language project, to sue the principal investigator of the Nim project, Herbert Terrace, for using frames from their films of Washoe in a publication (Terrace, personal communication). Certainly the major catalyst was Terrace’s 1979 *Science* article, in which he became the *bête noire* of ape-language research by unambiguously concluding that Nim, the subject of his study, had not proved capable of acquiring rudimentary grammatical rules and that, furthermore, this was true as well of the other signing apes.² Needless to say, the Gardners and Francine Patterson, the teacher of Koko the gorilla, did not agree.

That source, however, is merely a historical event – the debate was a debate prior to it, albeit a cooler one. The more interesting causes of both the intellectual differences and the emotionality inhere in the topic of the argument itself. For articulate language is not just one among other capacities thought to be exclusively human abilities. No one would get excited, it has been observed, if it were shown that an ape could mix a dry martini (Atherton and Schwartz 1983). Rather, language, at least in the European intellectual tradition, is the quintessential human attribute, at once evidence and source of most that is transcendent in us, distinguishing ours from the merely mechanical nature of the beast. Language is regarded as the *sine qua non* of culture, and its presence in our species is the most salient behavioral difference between us and the other hominoids – with the relinquishing of tool use and, more recently, tool making (Goodall 1971; Beck 1980) as uniquely human capabilities, the significance of language as a separator has grown. And resistance to losing our quintessential attributes is, arguably, itself one of those uniquely human traits. Hence, some ape partisans (Linden 1974; Gysens-Gosselin 1979)

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have argued, the prevalent reluctance to accord the talking apes their due. An occasional variant of this interpretation is the accusation that those who refuse to recognize ape language are insufficiently committed to the Darwinian perspective or, worse, are anti-Darwinian. Thus Linden (1987) depicts those who question the likelihood of ape–human linguistic continuities as ‘latter-day Wilberforces, averse to investigating “creatures who threaten to paralyze us by shedding light on the true nature and origins of our abilities” (p. 8).

A countervailing vector of our ideology, perhaps peculiar to our culture but possibly pancultural, consists of careless anthropomorphic projection and an irrepressively attractive vision of communication between our own and other species. In fact, it seems correct to observe that, at least until recently in the debate and probably up to the present, the majority opinion, both lay and scientific, regarding the linguistic capabilities of the apes has been positive. People seem not only accepting but positively desirous of the possibility of ape language.

Even if language did not have the sacrosanct status it does in our conception of human nature, the question of its presence in other species would still promote argument, for we are lacking any universally accepted, unassailable diagnostic criteria for language. There is no shortage of candidates for the indispensable attribute of language. For Katz (1976) and Limber (1977), the projective capability is crucial, the provision of language for the articulation of any conceivable new proposition through a novel combination of words. Savage-Rumbaugh (1981) holds the referential nature of individual symbols to be the essence of language, while Premack (1984) and Marshall (1971) see the capacity for representation of real-world situations to be paramount, and so on. The property most commonly invoked as definitive of language is its predication on a system of abstract rules for the production and interpretation of utterances – in other words, grammar. Hockett’s (1959, 1960, 1963; Hockett and Altmann 1968) famous list of so-called design features of language – including rapid fading, duality of patterning, and displacement – has provided a useful orientation for those trying to capture the differences between human and non-human natural systems of communication. What is wanting, nonetheless, is consensus on what the necessary and sufficient, as distinguished from inessential, property or properties of language are and hence on how we might unequivocally identify language in another species.

This problem of defining features is more severe where the language of the young child is concerned, and it is the child’s language that is taken by most parties to the debate to be the proper material for comparison with the apes.³ If the young child is not, in fact, capable of linguistically encoding anything she can think of, if her production and understanding

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of utterances do not suggest abstract grammatical constituents and processes, then can it be said that the child has language? Limber (1977) and Lightfoot (1982), at least, would say no.

This is a defensible position, its major problem found in the fact that the young child's language, which may not yet be language, will eventually become language. How is this discontinuity in development to be bridged? The difficulty is not the existence of a discontinuity per se – there are a number of others in human development. The physiological transition from prepubescence to pubescence, for example, poses a similar problem – the two developmental phases are identifiably distinct, yet there are no two adjacent points in time about which it could be said that the child was prepubescent in the first but pubescent in the second.

What makes the transition from “nonlanguage” (hereafter early language) to language more problematic is that, unlike the case of puberty, in which the first phase is defined largely by the absence of characteristics of the later one, early language has its own, very salient features. Moreover, there are some striking functional and possibly structural similarities between these features and those of adult language. The two-year-old manages the major “speech acts” – the performatives – of the adult speaker, executing declaratives, requests, imperatives, and so forth (Dore 1975; Bates *et al.* 1979). And, contrary to those who would deny language to the young child, there is extensive evidence for grammatical structure in the earliest word combinations (Bloom 1970; Brown 1973), and, some have suggested (De Laguna 1927; McNeill 1970), in single-word utterances as well. (The proper characterization of this structure, however, is the subject of ongoing debate in developmental psycholinguistics – in fact, this may be the dominant concern of the field. This issue will be discussed in chapter 6.)

Language, in summary, is central to our self-definition as a species, even though we have yet to derive an adequate definition of language itself, one that includes the essential but excludes the merely contingent.

Behaviorist roots of the ape-language experiments

There is an additional source of the contention surrounding the ape-language question. The issues in the debate tend to resonate along the longstanding cleavage within the behavioral sciences between those who advocate study of cognition and/or innately determined behavior, on the one hand, and those, on the other, who are behaviorist in method and theory.

Behaviorism, or stimulus–response psychology, came into being in the early decades of this century as an avowed antidote to the introspectionist

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trend in turn-of-the-century psychological investigation. Knowledge, thought, intention, affect, and all other unobservable mental phenomena were banished in favor of overt behavior as the only proper subject of a scientific psychology.⁴ To explain the behavior of animals, behaviorism, like the eighteenth-century empiricism from which it descends, posits a bare minimum of cognitive apparatus: (1) perception, (2) a capacity to represent in durable format the results of perception, and (3) the ability to form associations among those representations. In the behaviorist paradigm, the acquisition and strengthening of such associations constitute learning.

An association may be formed between a perceptual stimulus and an inborn response if that stimulus consistently accompanies another one that is innately connected to the response, as in the celebrated conjunction of the ticking of a metronome, food, and salivation in Pavlov's dogs. Or an animal may form an association between one of its own actions and a subsequent stimulus, as when a pigeon comes reliably to peck a button because its activation results in the dispensing of food. In this process, an association is created between an action and a following stimulus that "reinforces" that action. To qualify as a reinforcing stimulus, a consequence need not be one that we would regard a priori as satisfying or pleasant – in fact, any stimulus that increases the probability of the organism emitting the behavior that preceded it is, by definition, reinforcing.

In the behaviorist conception, all behavior is determined either by current stimuli or by past consequences. Language is verbal behavior; words function both as responses to stimuli and as stimuli themselves, eliciting further responses. Thus a sentence can be interpreted as a chain of stimulus–response events, each word a response to the preceding one and also a stimulus evoking the next, with the first word elicited by an environmental stimulus or an internal one, a "private event." Or, in some formulations, the entire sentence is regarded as one complex response to a stimulus.⁵

The orthodox behaviorist account of learning has little use for traditional distinctions among types of behavior. Nor are species differences in behavioral mechanisms acknowledged. Although sometimes touted as such, the latter attitude is not an appreciation of evolutionary continuity, with the selectively and historically wrought similarities and divergences in behavior that such a theoretical affirmation entails. Rather, it reflects a commitment to cross-species *homogeneity*, a rejection of the notion that there are important differences across species in the processes that underlie the development and causation of behavior. As Skinner once observed in noting the similarity of learning curves produced in three different

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organisms through reinforcement, “Pigeon, rat, monkey, which is which? It doesn’t matter” (1956, p. 230). And thus the Gardners, in contesting the belief that there are differences in kind among language, other forms of human behavior, and behaviors of nonhuman animals, offer their scientific credo: “If a form of behavior such as human language appears to be different in character from other forms of human and animal behavior, then we do not abandon the search for general laws; instead we question the adequacy of existing observations” (1978, p. 37).

Like other contemporary adherents of behaviorism, the ape-language experimenters embraced the various concessions to reality that the most primitive versions of behaviorism were forced to make over the years. The Gardners, for example, acknowledge that some parts of the innate behavioral repertoire of a species are more plastic and hence more readily conditioned than others, and also that species differ in their intrinsic propensities for various behaviors. Thus the chimpanzee’s inborn motivation to communicate obviates conditioning as laborious as another behavior might require. That language acquisition in the chimpanzee and in the child are similarly dependent on extensive molding, shaping, and imitation, however, is an assumption that is fundamental to their research, and fundamentally erroneous. Indeed, their suggestion that the linguistic performance of the preschool child requires “intensive training” (1971, p. 118) is the *opposite* of one of the few claims to which virtually all language-acquisition researchers would assent.

It would be misleading to suggest that all of the proponents of ape language were behaviorists and all detractors cognitivists or ethologists. It is true that nearly all of the experimenters in this area were trained in the behaviorist tradition. Yet several eventually came to view their projects and the question of language in general in a way quite at variance with the presumptions of radical behaviorism. And, conversely, among the believers in ape language are psychologists of cognitive orientation and linguists. Nevertheless, the aspirations initially underlying the projects derived from behaviorist conceptions of the nature of language, and much of the criticism of those projects has been essentially a critique of these notions along the lines of Chomsky’s (1959) vivisection of Skinner’s treatment of language in *Verbal Behavior* (1957).

Lastly, it may be worth observing that the potential personal rewards of the ape projects have been substantial and emotional commitment commensurately high – the first person or team to give language to another species would certainly attain scientific immortality.

2

History of the ape-language projects

EARLY STUDIES

Before the Gardners’ innovative attempt, described below, to inculcate a *visual* human language in a nonhuman primate, at least half a dozen projects had been undertaken with the aim of either actively conferring a spoken language on an ape or observing the possible “natural” acquisition of one within a human home environment. The linguistic results in each case were dismal.

Witmer (1909) reported on a chimpanzee that had been trained to approximate crudely the word “mama.” Furness (1916) succeeded, after much labor, in getting an orangutan to utter a discernible “papa” and “cup.” Hayes and Hayes (1951) attained the greatest success among these early projects; at the end of six and a half years of home-raising a chimpanzee, Viki, the Hayeses had managed to teach her to utter “papa,” “mama,” “cup,” and, less successfully, “up.” But Viki’s articulation was poor and there was little evidence that these words served a referential, that is, symbolic, function for her.

On the other hand, the apes’ “comprehension” of spoken words and phrases substantially exceeded their productive abilities. For example, Gua, a chimpanzee home-reared by the Kelloggs (1933), outpaced the Kelloggs’ young son in the number of phrases to which she could respond correctly. This was true up to the end of the fourth month of the study, after which the boy surpassed Gua. Rather than positing understanding, Kellogg (1968) speaks of the chimpanzee “reacting correctly,” but he does not address the question of how much of this reacting could be attributed to linguistic decoding as distinguished from nonlinguistic cues and contextual information.

Several of these investigators noted the ape’s proclivity for gesturing. Both Viki and Gua employed numerous gestures that were associated with specific activities in that the chimpanzee made the gesture either

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prior to engaging in the activity or in an attempt to induce the caretaker to do so. Kellogg (1968) points out that there is no reason to assume these gestures were intentional signals as opposed to mere behavioral correlates of the activities they accompanied. The Hayeses (1954), on the other hand, do not hesitate to interpret Viki's gestures as communicative, and, in fact, Kellogg himself characterizes Gua's in the same way later in the same article.

This natural predisposition to gesture, coupled with the ape's well-known penchant for imitation, prompted Yerkes to speculate:

Perhaps the chief reason for the ape's failure to develop speech is the absence of a tendency to imitate sounds. Seeing strongly stimulates to imitation; but hearing seems to have no such effect. I am inclined to conclude from the various evidences that the great apes have plenty to talk about, but no gift for the use of sounds to represent individual, as contrasted with racial, feelings or ideas. Perhaps they can be taught to use their fingers, somewhat as does the deaf and dumb person, and thus helped to acquire a simple, nonvocal, "sign language." (1925, p. 180)

Yerkes' idea was not unprecedented. Ward (1983) provides this extract from the diary of Samuel Pepys, entered August 24, 1661:

At the office in the morning and did business. By and by we are called to Sir W. Battens to see the strange creature that Captain Holmes hath brought with him from Guiny; it is a great baboone, but so much like a man in most things, that (though they say there is a Species of them) yet I cannot believe but that it is a monster got of a man and she-baboone. I do believe it already understands much english; and I am of the mind it might be taught to speak or make signs. (Latham and Matthews 1970, p. 60 [quoted in Ward 1983, p. 341])

In "Bertran and Bimi," a story about an animal trainer and an orangutan, Kipling created the following scene, in which a sailor describes an encounter with Bimi, the orangutan:

Den I felt at der back of my neck der fingers of Bimi. Mein Gott! I tell you dot he talked through dose fingers. It was der deaf-and-dumb alphabet all complete. He slide his hairy arm round my neck, und he tilt up my chin und look into my face, shust to see if I understood his talk so well as he understood mine. (1891/1907, pp. 339–40 [quoted in Ward 1983, p. 341])

Apes and speech

It is not necessary to ascribe the linguistic failure of the animals in the early studies to a general deficit in language-related neurology, for it is now widely held that acquisition of a *verbal* language by nonhuman primates is precluded by the dominance of the limbic system, the "emotion centers" of the brain, in primate vocalization (see chapter 8). Although human